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Notes and short scientific papers relating to the botany of the region are welcomed and will be published to the extent that the size of the Journal allows.

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CASTANEA

The Journal of the Southern Appalachian Botanical Club

Vol. 16 March, 1951 No. 1

The Ratios of Clockwise and Counterclockwise Spirality Observed in the Phyllotaxy of Some Wild Plants

H. A. Allard

INTRODUCTION

During a study of the ratios of clockwise and counterclockwise spirality occurring in the phyllotaxy of several varieties and strains of *Nicotiana tabacum* L., and *N. rustica* L., some attention was given to several wild plants of other families, including both herbaceous and woody types. Among the herbaceous plants were the following: Wood nettle, *Laportea canadensis* (L.) Gaud. Urticaceae; smartweed, *Polygonum hydropiper* (?), Polygonaceae; lamb's quarters, *Chenopodium album* L., Chenopodiaceae; pokeweed, *Phytolacca americana* L., Phytolaccaceae; garlic mustard, *Alliaria officinalis* Andrz., cruciferae; yarrow, *Achillea millefolium* L., compositae; goldenrod, *Solidago altissima* L., and *S. serotina* Ait., Compositae.

The woody plants included smooth alder, *Alnus serrulata* (Ait.) Willd., Betulaceae; staghorn sumac, *Rhus typhina* L., and smooth sumac, *R. glabra* L., Anacardiaceae; tree-of-heaven, *Ailanthus altissima* (Mill.) Swingle, Simaroubaceae; wild senna, *Cassia hebecarpa* Fern., Leguminosae.

The usual phyllotaxy of all these plants is a 2/5 arrangement, but a 3/8 arrangement may be found on the steam in some instances. This has been noted in the case of goldenrod, *Solidago altissima*, and wild senna, *Cassia hebecarpa*. These changes have no effect upon the direction of the spiral course of arrangement of the leaves.

A vast amount of study has been given to phyllotaxy and this has naturally included the question of the direction of spirality as expressed in the alternate-leaved plants. Since the lack of a uniform terminology in the past has led to much confusion, it is extremely important to define one's concepts and terms used.

Table 1.—Occurrence of clockwise and counterclockwise plants in several herbaceous and woody species of wild plants growing in the Washington area.

Place of growth and date studied	Plants or branches in sample	Plants with spiral				Probability of occurrence
		Clockwise	Counterclockwise	Expected mean	X^2	
		HERBACEOUS				
		Laportea canadensis				
On canal near Washington, D. C., May 14, 1944	48	26	22	24	0.33	0.50-0.70
		Polygonum hydropiper				
Arlington, Va., July 1, 1945	305	146	159	152.5	0.55	0.30-.50
		Chenopodium album				
Beltsville, Md., June 5, 1944	102	39	63	51	5.65	.01-.02
Beltsville, Md., June 20, 1944	106	57	49	53	0.602	.30-.50
Beltsville, Md., Aug. 8, 1944	118	58	60	59	0.034	.80-.90
Arlington, Va., June 24, 1945	205	99	106	102.5	0.24	.50-.70
Arlington, Va., May 28, 1944	724	344	380	362	1.79	.10-.20
Arlington, Va., May 26, 1944	424	211	213	212	0.009	.90-.95
Arlington, Va., June 29, 1945	177	90	87	88.5	0.051	.80-.90
Total	1,856	898	958	928	1.94	.10-.20
		Phytolacca americana				
Arlington, Va., July 1, 1945	234	110	124	117	0.838	.30-.50
		Alliaria officinalis				
On canal near Washington, D. C., May 20, 1944	211[1]	115	96	105.5	1.71	.10-.20
On canal near Washington, D. C., May 14, 1944	236[2]	135	101	118	4.90	.02-.05
Total	447	250	197	223.5	6.28	.01-.02
		Achillea millefolium				
Marlboro, Md., Aug. 9, 1944	45	25	20	22.5	0.554	.30-.50
Marlboro, Md., Aug. 8, 1944	60	27	33	30	0.6	.30-.50
Marlboro, Md., Aug. 15, 1944	15	7	8	7.5	0.066	.70-.80
Do	26	20	6	13	7.54	.001-.01
Do	23	11	12	11.5	0.043	.80-.90
Do	20	9	11	10	0.20	.50-.70
Marlboro, Md., Aug. 9, 1944	63	36	27	31.5	1.28	.20-.30
Do	53	20	33	26.5	3.19	.05-.10
Total	305	155	150	152.5	0.082	.70-.80

			Solidago altissima			
Arlington, Va., May 21, 1944	91	40	51	45.5	1.33	.20-.30
Arlington, Va., May 26, 1944	80	33	47	40	2.45	.10-.20
Marlboro, Md., Aug. 15, 1944	30	19	11	15	2.13	.10-.20
Marlboro, Md., Aug. 9, 1944	51	24	27	25.5	1.76	.10-.20
On canal near Washington, D. C., May 12, 1944	34	20	14	17	1.06	.30-.50
On canal near Washington, D. C., Oct. 12, 1944	31	13	18	15.5	0.806	.30-.50
Do	7	6	1	3.5	3.57	.05-.10
Do	15	9	6	7.5	0.6	.30-.50
Total	339	164	175	169.5	0.36	.50-.70
			Solidago serotina			
On canal near Washington, D. C., Oct. 12, 1944	20	12	8	10	0.80	.30-.50
			WOODY			
			Alnus serrulata			
On canal near Washington, D. C., Oct. 12, 1944	11[4]	7	4	5.0	0.82	.30-.50
Do	11[5]	6	5	5.5	0.091	.70-.80
Do	7[6]	4	3	3.5	0.14	.70-.80
Do	12[7]	3	9	6	3.00	.05-.10
Do	18[8]	9	9	9	0.00	.99+
Total	59	29	30	29.5	0.016	.80-.90
			Rhus typhina			
On canal near Washington, D. C., May 21, 1944	36[9]	15	21	18	1.00	.30-.50
Do	12[10]	6	6	6	0.00	.99+
Total	48	21	27	25	0.75	.30-.50
			Rhus glabra			
On canal near Washington, D. C., May 21, 1944	16[11]	9	7	8	0.25	.50-.70
			Cassia hebecarpa			
Arlington, Va., June 28, 1945	21	8	13	10.5	1.19	.20-.30

[1] Branches from 27 plants.
[2] Branches from 44 plants.
[3] Branches from 6 plants.
[4] Branches from 3 plants.
[5] Branches from 1 plant; main stem clockwise.
[6] Branches from 1 plant; main stem clockwise.
[7] Branches from 1 plant; main stem counterclockwise.
[8] Branches from 1 plant; main stem clockwise.
[9] Branches from 6 plants.
[10] Branches from 1 plant.
[11] Branches from 3 plants.

In all my own observations embodied in this and in other published papers, I have used consistently the terms *clockwise and counterclockwise*. In clockwise twining, the tip of the stem as seen from above follows a clockwise direction of revolution. In this arrangement the visible sections of the twining stem incline upward from right to left. In the counterclockwise twining, the tip of the winding stem follows a course opposite to that of the hands of a clock. In this method of twining the visible sections of the spiral on the support ascend from left to right. Jost *(1)* in his Plant Physiology, carefully illustrates these two spiral directions, but calls my clockwise spiral *right-handed,* and my counterclockwise spiral *left-handed.* I have carefully defined and illustrated the clockwise and counterclockwise spirals in a previous paper on the phyllotaxy of tobacco *(2).*

FREQUENCY OF CLOCKWISE AND COUNTERCLOCKWISE SPIRALITY IN SEVERAL SPECIES OF HERBACEOUS AND WOODY PLANTS

If a population of alternate-leaved plants of a species is studied, it will be found that the spiral arrangement may be clockwise or counterclockwise both on the main stem and on the branches. The data for the plants following have been secured from colonies in the Washington area, often widely separated. This has seemed desirable to increase the chances of discovering any extremes of the frequency of cloekwise and counterclockwise arrangement if such exist.

DISCUSSION AND CONCLUSION

Referring to the data of Table 1, it is indicated from the chi-square values that the clockwise and counterclockwise arrangement of the leaves follows closely an inherent 50:50 ratio. In very few instances has the value exceeded 3.841, which is considered merely significant. The various samples would appear to have been drawn from a population with a 50:50 ratio of clockwise and counterclockwise spirality. These results secured for the several wild herbaceous and woody plants of the present study are in agreement with studies made of many thousand of tobacco plants, the results of which appeared in a paper published by the U. S. Department of Agriculture *(3).*

It was indicated in earlier papers *(2)* by the writer that the clockwise and counterclockwise spirality in tobacco closely approximates equality of ratio.

While the present study for the most part is concerned with the spiral arrangement of the leaves of the main stem, it will be seen from Table 1 that in a number of instances the spiral arrangement

of the branches was determined. It is evident that whatever spirality prevailed on the main stem, the spirality of the branches has shown a random distribution in direction.

It may be stated that these results are in agreement with studies of Imai *(4)*, who found the same equality of ratio in all the plants which he studied. His studies included sweet potato, *Ipomoea batatas* (L.) Poir,; Japanese morning glory, *Pharbitis nil* Choisy (*Ipomoea nil Roth*), and the branches of an oak tree *Quercus vibrayeana* Franch & Sav.

DeVries *(5)* studied the spirality of the leaves of the main stems of *Dipsacus sylvestris* Huds., and found 245 right-handed and 239 left-handed plants, an exceedingly close approximation to the 50:50 ratio.

Macloskie *(6)* studied antidromy in various plants, one being *Spiranthes praecox* (Walt.) Wats. & Coult., and found equality of ratio. Koriba *(7)* found the same relation in *Spiranthes australis* Lindl.

Davies *(8)* studied 500 plants of the tree-of-heaven, *Ailanthus altissima*, and found 258 clockwise and 242 counterclockwise, giving a chi-square value of 0.256, indicating a purely random distribution.

Cook *(9)* reported equality of ratio in the right- and left-handed spirals of the cones of *Pinus austriaca* Link (*P. nigra* Arnold, var. *austriaca* Aschers & Graebn.), and *P. pumilio* Haenke.

Lugard *(10)* reported that the direction of the spirals in Egyptian cotton was not inherited and that the branches did not follow the course of the spiral of the main stem.

It would seem, then, that the direction of spirality shown in the main stem, the branches and in other structures of most plants where this spirality is regular, as in the plants studied, is a purely random phenomenon with no genetic control. The direction of spirality does not always appear so regularly, however. A species of *Helenium* from Durango, Mexico, grown in the greenhouse from seed, often appeared to have no regular direction of spirality on either the main stem or the branches. In this plant reversals of the spiral arrangement appeared to occur at any time, and the leaves were often opposite or arose from the same node, as well as alternate. Such plants may represent exceptions to the usual regularity of spirality.

Perhaps such exceptions should be expected since even in twining plants, while many species follow an invariable clockwise or counterclockwise revolution, several, according to Jost *(1)* p. 456, show alternations in their direction of twining. Examples are *Blumenbachia lateritia Brit.* (*Loasa lateritia* Hook.) and *Boweia volubilis* Harv.

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WASHINGTON, D. C.

Host Distribution of Mistletoe in Kentucky

CLYDE F. REED AND PRISCILLA G. REED

For a year we had looked everywhere in Kentucky for plants – in the mountains, in the swamps, along the rivers, under the cliffs, in the rockhouses, everywhere – but it wasn't until after our honeymoon that we realized that we hadn't collected up in the trees. For there abided that alluring loranthid which so often eludes even the botanist's attention – except upon occasion. Seemingly we had never found the occasion, till now. And now, we felt that more should be known about the distribution of Mistletoe in Kentucky. This report deals chiefly with the data of botanical importance which we have collected concerning the host distribution of *Phoradendron flavescens* in Kentucky.

In our travels over the State of Kentucky we have noticed quite a variance in the hosts upon which Mistletoe grows. The wintertime seems the best time during which to study Mistletoe, since it is quite visible; besides there is no romance about sitting under a tree with Mistletoe in it in the wintertime, so we might as well find a better motive for hunting it.

On occasions when stopping to inquire about Mistletoe in a region, one could hear a *sub sono*, "Silly people", "Isn't that sweet" or "Some peculiar people in this world." Anyway, we *were* interested in Mistletoe. We wanted to know in what kind of tree it grew, whether it was common in that region and what use the people made of it. Concerning the kinds of trees, we got a mixture of reliable species and what-you-call-it species; concerning the frequency in an area the answers were quite accurate since most people knew where there was a lot of it; but concerning what use people made of Mistletoe, we never seemed to have asked the right people, since they had never used it for anything. (Note: Hanging it over the doorway during various holidays was not considered a use, but in some cases a "must" for an excuse).

In looking through the literature on Mistletoe there are several reports of the extent to which it attacks its hosts in various areas Curtiss in 1878 stated that in Florida it was on nearly every kind of tree and sometimes parasitic upon itself. Harper (Econ. Bot. of Alabama, 1928) lists 20 genera in Alabama upon which it is parasitic. Fernald (Rhodora, 1937) mentions it as being found on a new host, *Betula nigra*, by Long in North Carolina. Wood (Rhodora, 1944) lists three hosts for the Roanoke County, North Carolina area: *Quercus rubra, Acer saccharinum* and *Diospyros virginiana*. A more

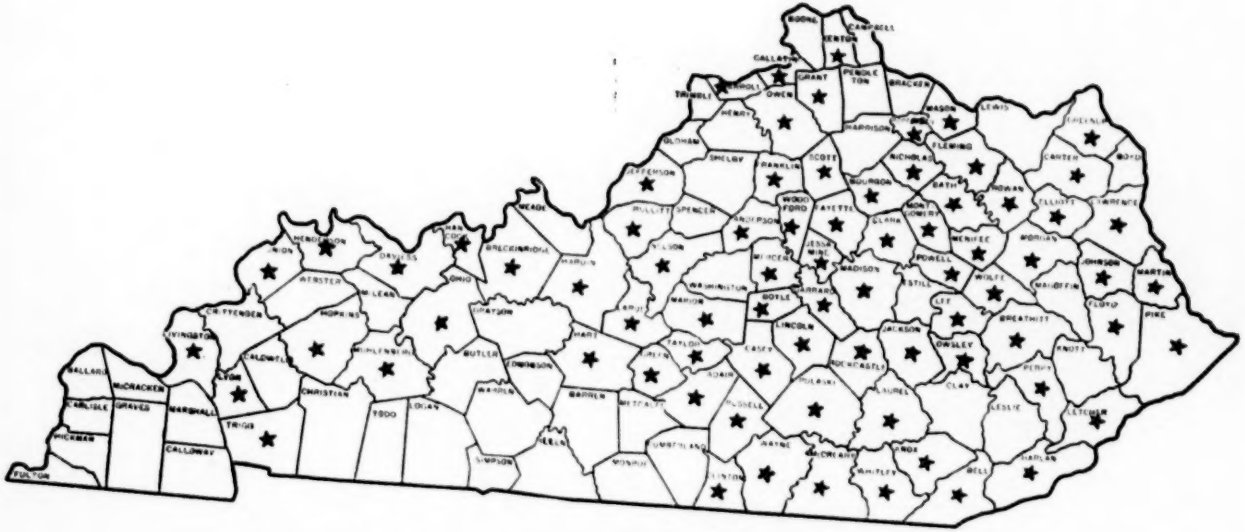

Fig. 1.—Map of Kentucky showing distribution of Phoradendron flavescens.

extensive account of the parasitism of mistletoe on persimmon is given by Baldwin (Rhodora, 1949), who lists several localities in Virginia and one in Alabama where mistletoe attacks this host. Deam in the Flora of Indiana (p. 402) lists several hosts for that State: *Acer rubrum, Acer saccharinum, Gleditsia triacanthos, Juglans nigra, Nyssa sylvatica, Quercus palustris* and *Ulmus americana.* Jones in the Flora of Illinois mentions it on the American Elm, Black Gum, Oak and several other deciduous trees. In New Jersey, Pennsylvania and Maryland mistletoe is invariably found on *Acer rubrum* and *Nyssa sylvatica.*

Other than a few brief notations in Dr. Lucy Braun's Annotated Catalog of Spermatophytes of Kentucky to the effect that Mistletoe is "Widely distributed and especially abundant in the Bluegrass section. Parasitic on many species of trees," there has been no extensive survey of the hosts upon which Mistletoe grows in the State of Kentucky, and consequently no distributional data concerning the species in this State are available.

Miss Braun listed 32 counties in which she had recorded seeing Mistletoe in various trees. We have found it in 76 of the 120 counties in Kentucky. The other counties we have not been in recently to check the Mistletoe there. In all probability Mistletoe is to be found in every county in Kentucky, with the possible exception of some of the counties in the Jackson Purchase Area. I have been through that region and have seen it in only a few trees.

The data presented in this paper represent several hundred sight locations and innumerable specimen locations. Practically all references bear the host identification.

The generalities brought out in these data are: (1) Mistletoe (a) attacks walnuts and elms predominantly in the Bluegrass Area; (b) attacks gum predominantly in the Silurian-Devonian and Mississippian Areas; and (c) also, besides sour gum, attacks some oaks in the Pennsylvanian Area; (2) Mistletoe lives on hosts that have their roots in various calcareous formations in Kentucky, in the Ordovician, the Silurian and the Mississippian. Walnuts in the Mississippian and Pennsylvanian are only rarely attacked, yet over 80% of the walnuts on the Ordovician formations are attacked.

A. **Ordovician or Blue Grass Area.** The Blue Grass Area of Kentucky is divided into the Outer, which is the more extensive formation, and the Inner, which is mainly around Lexington, Blue Grass. Both are calcareous in nature and elevated from 900 feet to nearly 1100 feet above sea level. The area is relatively flat with occasional rolling terrain; only in the region of the Kentucky River

and its tributaries are there precipitous cliffs of outcropping limestone.

This region extends from west of Owingsville (Bath Co.) north to Maysville (Mason Co.) on the Ohio River and south to and beyond Richmond (Madison Co.) on the eastern side, extending westward across northcentral Kentucky to the edges of Trimble, Oldham, Jefferson, Bullitt, Nelson and Marion Counties. In all, 38 total or parts of counties are included in the Blue Grass Area.

In this region Mistletoe grows predominantly on Black Walnut and Elms. However, other hosts are attacked, in descending rank of frequency: Black Locust, Honeylocust, Hackberry, Maples, Osage Orange, Ash and Cherry. It has not been observed on Sour Gum, Sycamore or Poplars in this region.

B. **Mississippian Area.** Except for a peripheral area around the Blue Grass Area called the "Knobs", of Silurian and Devonian Formations, the Mississippian Formations make up the next major area in Kentucky on which Mistletoe finds its hosts. Nearly one-third of the exposed surface of Kentucky is either Lower or Upper Mississippian. In this area Mistletoe is predominantly found on Sour Gum, but in a few cases bordering the Devonian-Silurian it is on Cherry. The areas bordering the Western Coalfields are all Upper Mississippian, and Mistletoe is also found on Willow Oak. In the Lower Mississippian and the Pennsylvanian of Eastern Kentucky, it attacks Chestnut Oak and Black Oak, besides its common host, Sour Gum. Relatively little Upper Mississippian is exposed in eastern Kentucky.

C. **Pennsylvanian Areas.** In Kentucky the coalfields are divided into two distinct areas, the eastern area which extends from South Portsmouth (Greenup Co.) southward along about a 45° angle, cutting Carter, Rowan, Menifee, Powell, Estill, Jackson, Rockcastle, Pulaski and Wayne Counties. All the land east of this demarcation is Pennsylvanian in formation and constitutes the Eastern Coalfields. The Western Coalfields in Kentucky extend from Edmondson and southern Grayson Counties on the eastern side westward through Butler, Muhlenberg and Hopkins Counties and northward to Union, Henderson, Daviess and Hancock Counties. Mistletoe attacks Sour Gum predominantly in these regions with a few other hosts as Elms, Oaks and a few Walnuts along the edges.

D. **Jackson Purchase Area.** The area west of the Tennessee River (Kentucky Lake) is predominantly Quaternary in formation with a splash of Cretaceous on the eastern side. Incidentally, the Kentucky Woodlands between the Cumberland and Tennessee Rivers are made up of mostly Cretaceous soils. In these regions Mistletoe was

found to live on Cottonwood and Maples predominantly, with a few Birches toward the north of the Cumberland River.

Along the eastern margin of the Western Coalfields Mistletoe was found on Willow Oak, while along the western margin it attacks Persimmon (the only records in this state), Elms, Hickory and Honeylocust. Another area where the hosts seem different is that along the Cumberland River, in the region of Barbourville, in Knox County in the southeastern part of the state, where it attacks Sycamore, Elms and a few Sour Gums. The leaves of the Mistletoe collected from Sycamores are distinctly more yellow than are the leaves of plants taken from any of the other hosts.

We have observed or collected *Phoradendron flavescens* on 24 species of woody trees in the State of Kentucky, representing 19 genera. The five most commonly attacked species of trees are Black Walnut, Black Gum, American Elm, Black Locust and Honeylocust. We have never observed it parasitic upon itself. The species upon which we have collected data are: *Juglans nigra* L., *Nyssa sylvatica* Marsh., *Ulmus americana* L., *Gleditsia triacanthos* L., *Robinia pseudoacacia* L., *Celtis occidentalis* L., *Acer rubrum* L., *Acer saccharinum* L., *Maclura pomifera* (Raf.) Schneider, *Fraxinus americana* L., *Prunus serotina* Ehrh., *Betula nigra* L., *Liquidambar styraciflua* L., *Populus deltoides* Marsh., *Quercus alba* L., *Quercus montana* Willd., *Quercus velutina* Lam.,*Quercus phellos* L., *Quercus macrocarpa* Michx., *Platanus occidentalis* L., *Diospyros virginica* L., *Carya glabra* (Mill.) Sweet., *Aesculus glabra* Willd. and *Malus pumila* (the apple).

COUNTY DISTRIBUTION IN KENTUCKY

Observations by Reed have definite localities, but only those hosts upon which observations and collections have been made are given. All specimens, unless otherwise noted, are in the Reed Harbarium.

Adair Co.—On Honeylocust, Rt. 61, just across the Adair-Green Co. Line in Adair Co., April 14, 1950. *Reed* 18504; observed by Reed on Black Locust, Elm, Sour Gum, Black Walnut.

Anderson Co.—Observed on Black Walnut and Elms by Reed.

Bath Co.—On Honeylocust, just east of Owingsville, Oct. 29, 1945. *Reed* 18199; also observed by Reed on Osage Orange, American Elm, Black Walnut, Black Locust, Ash, Maples; on Honeylocust, April 22, 1950. *Roy Penix*. (Reed Herb.); on Elm, April 22, 1950. *Roy Penix*. (Reed Herb.); on Black Walnut, March 18, 1950. *Roy Penix*. (Reed Herb.).

Bell Co.—On Black Gum, April 13, 1950. *Roy Penix*. (Reed Herb.); on Elm, April 15, 1950. *Roy Penix*. (Reed Herb.).

Bourbon Co.—Sight record by Miss Braun; listed by Willis on Bur Oak, Honeylocust, Fetid Buckeye and the Apple.

Boyle Co.—Observed on Black Walnut, Elm, Osage Orange and Black Locust by Reed.

Breathitt Co.—On Elm, Feb. 25, 1950. *Roy Penix*. (Reed Herb.); observed by Reed on Sour Gum (common) and Elms.

Breckinridge Co.—Observed by Reed on Black Walnut and Elms.

Bullitt Co.—Observed by Reed on Black Walnut.

Carroll Co.—Observed by Miss Lucy Braun.

Carter Co.—Observed near Carter Caves by Reed on Sour Gum.

Casey Co.—Observed by Reed on Elm, Black Walnut, Black Locust, Honeylocust.

Clark Co.—On Hackberry, 3 miles west of Winchester, April 14, 1950. *Reed* 18644; observed by Reed on Black Walnut, Black Locust, Cherry, Elms.

Clinton Co.—Observed by Reed on Black Walnut and Sour Gum.

Daviess Co.—Observed by Reed on Black Walnut.

Elliott Co.—On Sour Gum, March 3, 1950. *Roy Penix*. (Reed Herb.); also observed on Sour Gum by Reed.

Fayette Co.—Observed by Reed on Elms, Black Walnut, Hackberry, Black Locust.

Fleming Co.—Common on Black Walnut, fence rows between Hillsboro and Poplar Plains, Jan. 14, 1950. *Reed* 18232; observed by Reed on Elms, Black Locust, Honeylocust and Sour Gum; on Walnut, March 20, 1950. *Roy Penix*. (Reed Herb.); on Sour Gum, March 20, 1950. *Roy Penix*. (Reed Herb.).

Floyd Co.—On Elm, Feb .1, 1950. *Roy Penix*. (Reed Herb.); observed by Reed on Elm and Sour Gum.

Franklin Co.—Sight record by Miss Braun.

Gallatin Co.—Sight record by Miss Braun.

Garrard Co.—Observed by Reed on Black Walnut, Elm, Cherry.

Grant Co.—Observed by Reed on Black Walnut, Elm, Ash, Black Locust (common).

Green Co.—On Black Walnut, Rt. 61, not far from the Green River, April 15, 1950. *Reed* 18432; also observed on Elms and Honeylocust.

Greenup Co.—Specimen listed by Miss Braun in Herb. of Univ. of Cinn.

Hancock Co.—Observed by Reed on Black Walnut, Black Locust, Sour Gum, Elm.

Hardin Co.—On Willow Oak, Cecilia, April 30, 1950. *Reed* 18978; also observed on Black Walnut and Elm.

Harlan Co.—On Sour Gum, April 29, 1950. *Roy Penix*. (Reed Herb.).

Hart Co.—Sight record by Miss Braun.

Henderson Co.—Observed by Reed on Black Walnut, Sour Gum, Elm.

Hopkins Co.—Observed by Reed on Sour Gum and Elm.

Jackson Co.—Observed on Sour Gum by Reed.

Jefferson Co.—Observed on Black Walnut by Reed.

Jessamine Co.—On Black Walnut, limestone fields, above Brooklyn Bridge, April 14, 1950. *Reed* 18666; on Osage Orange, limestone fields, above Brooklyn Bridge, April 14, 1950. *Reed* 18665; on Cherry, limestone ledges, above Brooklyn Bridge, April 14, 1950. *Reed* 19665-A; also observed on Hackberry.

Johnson Co.—On Black Oak, Feb. 20, 1950. *Roy Penix*. (Reed Herb.); on Elm, Feb. 20, 1950. *Roy Penix*. (Reed Herb.); also observed by Reed on Sour Gum and Elms.

Kenton Co.—Sight record by Miss Braun.

Knox Co.—On Sycamore, west of Barbourville, Jan. 12, 1947. *Reed* 6487; on Sour Gum and Sycamores along the Cumberland River near Barbourville, Jan. 11, 1947. *Reed* 6483; also observed on Elms.

Larue Co.—Observed by Reed on Elms and Black Walnut.

Laurel Co.—Sight record by Miss Braun .

Lawrence Co.—Observed by Reed on Sour Gum.

Lee Co.—Observed by Reed on Elm and Sour Gum (common).

Letcher Co.—On Elm, Feb. 18, 1950. *Roy Penix*. (Reed Herb.); on Sour Gum, Feb. 18, 1950. *Roy Penix*. (Reed Herb.).

Lincoln Co.—Observed by Reed on Black Walnut and Elm.

Livingston Co.—Observed on Birch by Reed.

Lyon Co.—On Persimmon, Lamosco-Confederate Area, May 17, 1950. *Harold Barnett*. (Reed Herb.); on Elm, Clay Hill, between the Rivers, Highway No. 522, 1.8 miles from Kuttawa, April 18, 1950. *Julian and Walter Hudson*. (Reed Herb.); on Black Gum, level field, near Liberty Baptist Church, April 18, 1950. *Paul Wayne Lodd*. (Reed Herb.); also on Elm from this same locality; on Hickory, near Confederate, April 24, 1950. *Bobby Murphy*. (Reed Herb.); on Honeylocust, Lamosco-Confederate Area, May 17, 1950. *Harold Barnett*. (Reed Herb.). These specimens were collected by Mr. Thomas McCoy and his students and sent to me.

Madison Co.—Observed by Reed on Black Walnut and Elm.

Marion Co.—Observed by Reed on Elm, Black Walnut (common) and Black Locust.

Martin Co.—On Sour Gum, Inez, Feb. 4, 1950. *Roy Penix.* (Reed Herb.); observed by Penix on White Oak, Elm and Hickory; on White Oak, Feb. 3, 1950. *Roy Penix.* (Reed Herb.).

Mason Co.—On Black Walnut, 3 miles from Mayslick, May, 1950. *Bill Menges.* (Reed Herb.); observed by Reed on Black Walnut, Elm and Black Locust.

McCreary Co.—On Sour Gum, woods along Jenny's Creek, between Sand Hill and Whitley City, Oct. 23, 1949. *Reed* 18109.

Menifee Co.—On Sour Gum, near Frenchburg, April 22, 1950. *Hermitt Williston,* no. 26. (Reed Herb.); also observed by Reed on Sour Gum.

Mercer Co.—Observed by Reed on Elm, Black Walnut, Black Locust, Honeylocust (common), Hackberry.

Montgomery Co.—On Black Walnut, March 18, 1950. *Roy Penix.* (Reed Herb.); observed by Reed on Black Walnut, Elm, Black Locust, Honeylocust.

Morgan Co.—On Sour Gum, March 4, 1950. *Roy Penix.* (Reed Herb.); also observed by Reed on Sour Gum.

Muhlenberg Co.—On Sour Gum, 4 mi. east of Central City, April 28, 1950. *Reed* 18910.

Nelson Co.—Observed by Reed on Black Walnut, Elm, Cherry, Black Locust.

Nicholas Co.—Observed by Reed on Elm.

Ohio Co.—Observed by Reed on Black Walnut and Sweet Gum.

Owen Co.—Sight record by Miss Braun.

Owsley Co.—Observed by Reed on Sour Gum.

Powell Co.—Observed by Reed on Sour Gum.

Perry Co.—On Sour Gum, March 15, 1950. *Roy Penix.* (Reed Herb.).

Pike Co.—On Sour Gum, March 20, 1950. *Roy Penix.* (Reed Herb.); on Elm, Feb. 4, 1950. *Roy Penix.* (Reed Herb.); also observed by Reed on White Oak.

Pulaski Co.—Observed by Reed on Sour Gum in the southern part of the county, and on Black Walnuts and Elms in the northern portion.

Roberston Co.—Observed by Reed on Black Walnut.

Rockcastle Co.—Sight record by Miss Braun.

Rowan Co.—On Sour Gum, along Laurel Creek, 3 miles east of Elliottsville, March 19, 1949. Reed 14791; on Sour Gum, near Morehead Lookout, Feb. 6, 1950. *Clyde F. Reed* (sine no.); on Sour Gum, Feb. 11, 1950. *Roy Penix.* (Reed Herb.); observed along Cristy Creek on Sour Gum by Reed several places.

Russell Co.—Observed by Reed on Sour Gum, Black Walnut (frequent on both).

Scott Co.—Observed by Reed on Black Locust.

Taylor Co.—Observed by Reed on Black Walnut, Elm, Black Locust.

Trigg Co.—Observed on Elm and Maples by Reed.

Union Co.—Observed by Shacklette on Black Walnut, American Elm and Honeylocust. (in Masters Thesis).

Wayne Co.—Observed by Reed on Sour Gum.

Whitley Co.—Observed by Reed on Sour Gum.

Wolfe Co.—Observed by Reed on Sour Gum, common here.

Woodford Co.—Observed by Reed on Elm and Black Walnut (common).

A quick glance at the accompanying map of the actual observations of Mistletoe according to county shows that many of the counties in which we have not observed or collected this plant are surrounded by counties in which the plant has been found. For example, in the eastern half of the state, Mistletoe is probably found in Boyd, Knott, Magoffin, Lewis, Clay, Leslie, Estill, as well as Bracken, Pendleton, Campbell, Boone, Harrison, Henry, Oldham, Shelby, Spencer and Washington Counties. Students and others have told us that the plant is found near Ashland (Boyd Co.), Salyersville (Magoffin Co.), Manchester (Clay Co.) and so on. But, as we have not observed it there ourselves, nor do we have specimens from those places, these reports are not included in this paper at this time. Further observations in the state will probably fill in some of the apparent gaps in the host distribution of Mistletoe in the State of Kentucky.

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BALTIMORE JUNIOR COLLEGE

BALTIMORE, MD.

Late Flowering Dates of Some Common Plants of Rockland County, New York

DON RITCHIE

The earliest flowering dates of spring plants seem to have interested naturalists more than the latest dates of autumn species, with the result that records of fall-flowering species are probably less complete than those of the vernal ones. Of some twenty plants which may bloom well past the middle of November in the environs of New York City, three that I have found are given credit for that ability in the new eighth edition of Gray's *Manual of Botany*. The common dandelion is dated "March-September, and more or less through winter", the goldenrod, *Solidago ulmifolia* Muhl., is listed as flowering in August through November, and the witch-hazel, *Hamamelis virginiana* L., September-November.

Species reported as blooming into October, listed with their times of flowering as given in Gray's *Manual*, are *Linaria vulgaris* Hill, May-Oct.; *Aster dumosus* L., Aug.-Oct.; *Melilotus alba* Desr., May-Oct.; *Prunella vulgaris* L., May-Oct.; and *Solidago tenuifolia* Pursh, Aug.-Oct. Species listed as flowering only into September are *Achillea Millefolium* L., June-Sept.; *Cirsium vulgare* (Savi) Tenore, June-Sept.; and *Trifolium pratense* var. *sativum* (Mill.) Schreb., May-Sept. The common ox-eye daisy is described as blooming only from June to August. All these plants have been collected in flower in Rockland County, New York, as late as Nov. 17. A number of additional species are cultivated plants whose flowering periods are not specifically recorded.

The well-known ability of the violets to produce a crop of autumn flowers, generally not mentioned in manuals, is exemplified in this region by *Viola conspersa* Reichenb., whose blooms, collected late in November, are too normal and too numerous to be dismissed as aberrant or sporadic.

Of the plants named above, *Achillea*, *Cirsium*, *Melilotus* and *Trifolium* are stated in *Common Seed Plants of the Mid-Appalachian Region*, by Strausbaugh, Core and Ammons, to flower into November, and these plus the ox-eye daisy are counted as November bloomers by Britton and Brown in their *Flora*.

While November is not the month in which any of these plants reaches the height of reproductive activity, it is still a time in which there may be an abundance of normal flowers. It might be surmised that there has been during recent years a general warming of the continent, or that summers are somewhat longer than they used to be,

but weather records of New York State from 1896 to the present show neither a rise in the average yearly temperature nor a lengthening of the time between the last killing frost of spring and the first of autumn. It is doubtful that one could expect much flowering after November, at least in that part of the country as far north as 41° N., but it should be possible to find additional species blooming during November if steady search were made in that month.

BARNARD COLLEGE,
NEW YORK, N.Y.

Three Additions to the Flora of Georgia from the Blue Ridge Mountains

G. W. McDowell

The Walhalla topographic quadrangle of the United States Geological Survey shows, in Rabun County, Georgia, a circle of high ridges southwest of Rabun Bald inclosing the valley of Mill Creek. The creek is better known as Darnell Creek, and that names appears on other maps. My wife had visited the creek several times during a vacation at Dillard in 1944, and from her I learned of the splendid waterfalls and unspoiled forests to be seen in the valley.

Since I had not been to the locality, a visit to Darnell Creek was the object of a week-end trip on April 29, 1950, by my wife and me. We spent the night at Dillard, and the next morning drove to the entrance of the gorge through which the creek enters the wide cultivated valley of the upper part of the Little Tennessee River. We then followed a newly-constructed United States Forest Service road which replaced the path my wife remembered, and soon came to the first waterfall. The steep north-facing slope of the gorge at this point immediately attracted my attention, and I began to examine the luxuriant vegetation. Three of the plants first seen apparently had not been reported from Georgia. The three plants were a miterwort (*Mitella diphylla* L.), a conspicuous sedge (*Carex plantaginea* Lam.), and Dutchman's-breeches (*Dicentra Cucullaria* (L.) Bernh.). Only a few of the leaves of *D. Cucullaria* remained, and a collection was not made until a week later during a return trip with Dr. Wilbur H. Duncan of the University of Georgia.

The three plants were collected at an elevation of about 2,200 feet. The source of Darnell Creek on Rabun Bald is at an elevation of over 4,000 feet, but the plants were not observed in any other part of the valley. Specimens of the plants have been deposited in the herbarium of the University of Georgia.

Atlanta, Georgia

The Mosses of King Cove, Lawrence County, Alabama[1]

A. M. HARVILL

One of the major problems which confronts the bryogeographer is the paucity of distributional information from many regions. This is especially critical in parts of the southeastern states and the writer hopes to fill in a few of these gaps in the record.

The Warrior Basin of northwestern Alabama is actually a former plateau (Cumberland Plateau) which is now strongly dissected. The type of weathering of the Pottsville sandstone and conglomerate, which underlies the region, gives rise to rockshelters (Harvill, 1949) and deep coves and ravines. While making a study of the distribution of some trees of this region in the summer of 1949, Mr. C. B. Segars and I discovered a remarkable cove in the southwestern portion of Lawrence County, and with Mr. L. C. Crawford, numerous collections have been made at the place at intervals since that time. The area is known locally as King Cove and has not been visited by other botanists.

The luxuriant forest which occupies the cove is rich in species and it is impossible to designate any as especially characteristic. Among the most common trees are: *Tsuga canadensis* (L.) Carr., *Magnolia acuminata* L., *M. macrophylla* Michx., *M. tripetala* L., *Liriodendron tulipifera* L., *Betula lenta* L., *Juglans cinerea* L., *Fagus grandifolia* Ehrh., *Quercus alba* L., *Acer saccharum* Marsh. ,and *Tilia heterophylla* Vent. The lush growth of *Trichomanes Petersii* A. Gray on conglomerate boulders is evidence of the high humidity of the area and provides a clue to explain the occurrence of many plants which are found there.

Those species which are reported for the state for the first time are marked with an asterisk. Unless otherwise indicated, the collections were made by the writer. The specimens are preserved in the herbarium of the University of Alabama.

List of Species

SPHAGNACEAE

SPHAGNUM TABULARE Sull. On wet soil at the base of a rockshelter (determined by Dr. A. LeRoy Andrews). Collected by *L. C. Crawford* and *C. B. Segars.*

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[1]The writer is indebted to the Research Committee of the University of Alabama for support of the work.

FISSIDENTACEAE

*Fissidens cristatus Wilson. On a sandstone boulder, *5492*. Known from Tennessee, Georgia, and Florida.

F. polypoides Hedwig. On a conglomerate boulder, *5853*

F. subbasilaris Hedwig. On a conglomerate boulder, *6854*.

DICRANACEAE

*Campylopus flexuosus (Hedw.) Bridel. (*C. tallulensis* Sull. & Lesq.). On humus on sandstone, *Crawford and Segars.*

*Dicranodontium denudatum (Brid.) Hagen. Sandstone boulder, *5471*. Recorded from Tennessee, Georgia, and Florida.

Dicranum scoparium Hedwig. Sandy soil, *5480*.

LEUCOBRYACEAE

Leucobryum albidum (Brid.) Lindb. On sandy soil, *Crawford* and *Segars.*

L. glaucum (Hedw.) Schimper. Sandstone boulder, *5472*.

CALYMPERACEAE

Syrrhopodon texanus Sull. On a sandstone boulder *5472a*.

GEORGIACEAE

*Tetraphis pellucida Hedwig. On a sandstone boulder, *5457*. Known from Tennessee and Georgia.

BRYACEAE

*Pohlia Wahlenbergii (Web. & Mohr) Andrews. On sandstone, *5438a*. Recorded from Tennessee.

*Rhodobryum roseum (Hedw.) Limpr. Conglomerate boulders, *5458, 5473*. Known from Tennessee and Georgia.

MNIACEAE

Mnium affine Bland. On sandstone boulders, *5446, 5475*.

M. cuspidatum Hedwig. Sandstone boulder, *5474*.

*M. punctatum Hedwig. On sandstone rocks in a brook, *5485a*. Recorded from Tennessee, Georgia, and Florida. This species is rare in Alabama.

*M. longirostre Bridel. (*M. rostratum* Schram.). On a conglomerate boulder, *5460a*. Reported from Tennessee, Georgia, and Florida.

BARTRAMIACEAE

Bartramia pomiformis Hedwig. Sandstone boulder, *5491*.

CLIMACIACEAE

Climacium americanum Bridel. Sandstone boulder, *5491*

LEUCODONTACEAE

LEUCODON JULACEUS (Hedw.) Sull. Base of *Carya ovata* (Mill.) K. Koch, *5467*.

NECKERACEAE

POROTRICHUM ALLEGHANIENSE (C. Müll.) Grout. Sandstone boulders, *5445, 5459, 5485*. Very abundant.

HOOKERIACEAE

HOOKERIA ACUTIFOLIA Hooker. Crevices of sandstone rocks, *5492a*.

FABRONIACEAE

SCHWETSCHKEOPSIS DENTICULATA (Sull.) Broth. Sandstone boulder, *5451a*.

THUIDIACEAE

ANOMODON ATTENUATUS (Schreb.) Hüben. Sandstone boulder, *5487*.

A. ROSTRATUS (Hedw.) Schimper. Sandstone boulders, *5439, 5486, 5487*.

THUIDIUM DELICATULUM (Hedw.) Mitten. Conglomerate boulders, *5449, 5460*.

AMBLYSTEGIACEAE

CAMPYLIUM CHRYSOPHYLLUM (Brid.) Bryhn. Sandstone boulder, *5487a*.

C. HISPIDULUM (Brid.) Mitten. Sandstone boulders, *5461, 5486a*.

SCIAROMIUM LESCURII (Sull.) Broth. On sandstone in a rock-shelter, *5447a*.

BRACHYTHECIACEAE

CHAMBERLANIA ACUMINATUM (Hedw.) Grout. On detached boulders, *5460b, 6851*.

CIRRIPHYLLUM BOSCII (Schwaegr.) Grout. Sandstone boulders, *5448, 5470*.

HYPNACEAE

HYPNUM CURVIFOLIUM Hedwig. Sandstone boulder, *6852*.

*MITTENOTHAMNIUM DIMINUTIVUM (Hampe) E. G. Britton. On sandstone boulder, *5464a* (determined by Dr. W. C. Steere). Reported for the first time north of Florida, it is known from the West Indies, Mexico, Panama, and South America.

DIPHYSCIACEAE

DIPHYSCIUM CUMBERLANDIANUM Harvill. The type locality; on a sandstone boulder, *5464* (Harvill, 1950). Apparently endemic to Alabama.

D. FOLIOSUM (Hedw.) Mohr. Sandstone boulder, *5455a*. Rare in Alabama.

POLYTRICHACEAE

ATRICHUM XANTHOPELMA (C. Müll.) Jaeg. (*A. Macmillani* (Holz.) Frye., see Frye, 1949). Sandstone boulder, *5487b*. Probably widespread in Alabama.

A. UNDULATUM (Hedw.) Beauv. Sandstone boulders, *5447 5488*.

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DEPARTMENT OF BIOLOGY

UNIVERSITY OF ALABAMA

NOTES and NEWS

T. C. STOTLER*—Dr. T. C. Stotler was a dentist professionally, but his enduring love was nature's garden. He was born in 1859, near Old Fields, Maryland, where plant and rock forms lure one who loves the out of doors. But his weekend outings radiated from Harpers Ferry into Maryland, Virginia and West Virginia. Here he practiced his profession and his avocation, a communion with nature, as an amateur botanist. With others he worked out the rather unusual number of ferns around here, along with their customary habitat. A discussion of these, by Edgar T. Wherry, was published in the Journal of the Washington Academy of Science, Dec. 4, 1916. This is a study of the walking fern, *Camptosorus rhizophyllus.* A partial reprint is in the American Fern Journal, Vol. 7, No. 4, 1917. Dr. Stotler died in 1925.

*Editor's Note—This sketch of an amateur botanist of the Southern Appalachians, immortalized in the name of a rare fern, was prepared by one of his former associates.

Dr. Stotler had a keen eye for the unusual in form and place, whether trees, flowers or products of a sphagnum bog. In the course of his forays with the writer there was located an unusual fern here, appearing in two localities separated by a mountain ridge and the Shenandoah River. In both these localities, the plants were found in association with the Ebony Spleenwort, (*Asplenium platyneuron*), and the Pinnatifid Spleenwort, (*A. pinnatifidum*). Dr. Wherry, the well known authority on ferns, decided that a new variety of fern, considered a hybrid of the above Spleenworts, had been found, and named it *A. Stotleri*, for Dr. Stotler.—HENRY T. MCDONALD, HARPERS FERRY, W.VA.

DEATH OF W. WOLF.—Wolfgang Wolf, an occasional contributor to Castanea and other botanical magazines for over thirty years past, was born in Regensburg, Bavaria, January 16, 1872, and died at St. Bernard, Alabama, September 22, 1950. He came to St. Bernard Abbey, near Cullman, in the 90's, and soon became a lay brother in the Benedictine order, known to his associates and friends as Brother Wolfgang.

He seems to have known nothing of botany when he came to America, and for a number of years served as tailor for the Abbey. But he soon became fascinated by the considerable variety of native plants in the forests around him, and he managed to get together enough books to identify most of them, and gradually built up a modest botanical library and herbarium for St. Bernard College. Although Dr. Charles Mohr had made many visits to Cullman in the 80's and 90's mostly in summer, and discovered several new plants around there, Brother Wolfgang had one advantage over him in being there all the year round; and before long he began to find plants not adequately described in the books.

His first published new species was *Talinum Mengesii* (Am. Midl. Nat. 6:153-155. 1920), which was found to take the place of the better-known *T. teretifolium* in Alabama. Later he described *T. appalachianum*, as yet known only from a single locality near the center of the state, in the same magazine (22:324-331. 1939). About 1930 he began to suspect that there were more species of *Erythronium* in Alabama than the books allowed for, and after studying them for several years, described two new species in Castanea for February, 1941 (*E. Harperi* and *E. rostratum*). He also discovered and described two hybrid oaks, which he called *Quercus Bernardiansis* and *Q. Capesii*. The former was described in Torreya in 1918, and the latter in Castanea in 1945.

Early in his botanical experience his attention was called by some of his associates to a member of the Monotropaceae growing in his immediate vicinity, but always covered by fallen leaves, so that it was hard to find; and it was several years before he saw enough specimens to represent all stages and permit a thorough study of it. He then saw that it was related to *Monotropsis*, but that was currently described, in the books that committed themselves on that point at all, as having a capsular fruit, and was not supposed to occur in Alabama at all; while his plant had an indehiscent baccate fruit. That led him to conclude that he had a new genus, and even a new tribe; and he described it in considerable detail, with several illustrations, in the American Midland Naturalist, 8:104-127. 1922. Later it turned out that existing descriptions of *Monotropsis* were erroneous as to fruit, which was really just as Wolf had described it for his supposed new genus; and there were no other significant characters to separate it. So he had merely added another genus and species, *Monotropsis odorata* Ell., to the known flora of Alabama.

In describing new species Brother Wolfgang was hampered by the limited library and herbarium facilities of the college (a small junior college), though his superiors appreciated his work, and would doubtless have gotten more books and magazines for him if their slender funds had permitted. He was a very painstaking worker, and corresponded with several of the leading American taxonomists, some of whom visited him occasionally.

Most of his botanizing was done within walking distance of the college, in a sandstone region, but he made occasional trips to Warnock Mountain, with rich limestone slopes, in the next county south, and to Baldwin County in extreme southern Alabama; and on these trips he collected quite a number of plants which have been cited in monographs of various genera by other writers. He had been in declining health for years, and did no more field work in the last ten or twelve years, but left several unpublished botanical studies at the time of his death.—Roland M. Harper, University, Alabama.

Visual Aids in Botany—A new set of visual aids, based on the recent book, "Botany: An Introduction to Plant Science," by W. W. Robbins and T. E. Weier, was issued in October, 1950 by the publishers, John Wiley & Sons.

Consisting of 300 color slides, the set contains line drawings, photographs, and a large number of photomicrographs chosen by the authors to emphasize important structural details of botanical specimens. Although each slide is carefully coordinated with correspond-

ing sections in the Robbins and Weier "Botany," the collection provides a valuable supplement to any textbook on the subject.

THE TUSCALOOSA MEETING.—Members of the Southern Appalachian Botanical Club have been invited to participate in the 12th annual meeting of the Association of Southeastern Biologists at Tuscaloosa, Alabama, April 20 and 21. Botanical papers will be presented on the afternoon of April 20, at a session presided over by Dr. John N. Couch, Chairman of the Southeastern Section of the Botanical Society of America. If a sufficient number of botanical papers are submitted, a second session may be held on Saturday morning, possibly presided over by Dr. Royal E. Shanks, president of the Southern Appalachian Botanical Club. The two leading hotels in Tuscaloosa are the Burchfield and the McLester. Both list single rooms at $3.50 up and double rooms at $6.00 up. Opportunity will be provided for botanical excursions near Tuscaloosa.

BOOK REVIEWS

TWO TREE BOOKS—Reviews have recently been published of two wild flower guides, one in which both text and illustrations are grossly inaccurate, and the other in which the pictures are much better than the text. It has now been interesting to receive two popular books on trees, and to consider whether they are likewise open to criticism. First we have A Natural History of Trees.[1] This is a 620 page volume covering the trees of the northeastern and midland United States. For each there is given a statement of the range and characters, followed by an account of the history, botanical relationships, geological occurrences, practical uses, etc. The ranges were worked out with the aid of Professor Norman C. Fassett and are accordingly well stated. The descriptions would have been improved had a teacher of tree identification been called in. The general discussion is splendidly treated, and deserves the highest praise. Alas, the artist could not count, and shows White Pine as having 4 needles per cluster, Fringe Tree as having 3 petals per flower, and Pecan 7 leaflets to each leaf, whereas they are noramlly 9 to 17. There are many other inaccuracies, including acorns of the white oak group accompanying leaves of red oaks, and wrong shapes of various leaves, leaflets, fruits, etc. Although the author knows and rightly says the needles of Carolina Hemlock are obtuse or notched, the

[1]A Natural History of Trees. Donald Culross Peattie, illustrated by Paul Landacre. Boston: Houghton-Mifflin Co. 1950. $5.00.

[2]The Trees of Pennsylvania. William Carey Grimm. Harrisburg, Pa. Stackpole & Heck, Inc. 1950. $5.00.

artist makes them sharp-pointed. The stout needles of *Pinus pungens* are shown as slender, *Thuja* branchlets as terete. While one of the ways to identify an ash tree is by the opposite branching, the sketch shows the branches alternate. It is a great pity that what might have been a masterpiece is thus rendered impractical for use of teachers and misleading to the amateur.

But we also have a 375-page work on The Trees of Pennsylvania.[2] Here the author did both text and the more than 100 full page illustrations, and they can only be characterized as excellent. The data as to ranges are not in all cases up to date, and a few of the drawings could be improved in minor details, but on the whole this book can be unreservedly recommended to everyone who wishes to learn the trees of the Middle Atlantic states.—EDGAR T. WHERRY, UNIVERSITY OF PENNSYLVANIA.

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